Graphics

Overview

Effective visual design is an important tool for communication. Graphics provide visual cues that help the user know how to use the interface. Graphics can clarify and help users remember information, help establish and support branding, and draw attention to important information. Graphics can display information on its own, or illuminate textual information.

General Graphic Standards

The following Graphics standards are to be adopted across all CDC Windows and web based surveillance applications. These standards should lead to a more consistent and usable interface.

Use icons to represent CDC surveillance applications, custom files formats, and in toolbars to represent application functions. Do not use icons on command buttons.

Use standard Windows icons for common Windows functions.
Icons are pictorial representations of objects and provide visual cues, or affordances, as to how to use the interface. The Windows platform has a standard set of icons for common functions. Refer to *The Windows User Experience* for information about common Windows icons.

Custom icons may be developed for CDC surveillance applications only if they represent functions that are not common Windows functions and the function does not already have an icon in the master CDC Surveillance Icon List.
All custom icons for CDC surveillance applications must be approved before being added to the CDC Surveillance Icon List.

Custom icons must follow the standards for developing custom icons.
- Icons must be available in two sizes: 16 x 16 pixels and 32 x 32 pixels.
- Icons must be 2 dimensional (not 3 dimensional).
- Icons must use the same colors as Windows icons.
- Every icon must be unique and have a unique meaning.
- Icons must be users tested for understandability.

Refer to The Icon Book by William Horton for information on how to create icons (includes pictures and a CD-ROM of standard, universally accepted icons). Refer to The Windows User Experience for information about common Windows icons.

Use tool tips to explain icons instead of including text in the icon.
Do not include text as part of an icon. Text in an icon is hard to read. Instead, provide tool tips that appear when the cursor is placed over an icon to explain the icon. Also, it is easier to convert an application to other languages if the icons do not need to be changed. Often words in other languages are longer than English words and may not fit within the icon.

Each CDC surveillance application must have a unique logo that is an icon representing the application
The icon logo representing the CDC surveillance application must appear in the upper left corner of the application tool bar, and also be used to represent the application on the user's desktop and within file folders.

Graphics must support the content, data, and/or purpose of the application or web site.
Do not use graphics simply for the sake of having graphics. Graphics must have a purpose and support an aspect of the application or web site.

Do not use graphics that have negative cultural associations.
Be very aware of cultural associations when choosing graphics. Make sure the graphics are widely understood. Test them with different groups. Do not use any offensive images or gestures. For example, a pointing finger is considered offensive in some cultures while showing the bottom of one's shoes is considered offensive in Arabic countries. Use representations that are universally held. For example, the graphic use of scales to show balance is not a universal representation. In some countries, a black box around a photograph of a person indicates that the person is deceased. Have an outside firm experienced in cultural issues review your graphics.

General Graphic Guidelines

Graphics designers are trained in the art of visual communication, inherently adhering to the following principles. The design of a screen requires the combined perspective and experience of a graphics designer, Human-Computer Interaction specialist and technical developers. User input and validation is necessary as well. The following principles are very important when designing the organization and composition of visual elements of the user interface:

Place information on the screen based on its relative importance to other visual elements.
Use the principle of hierarchy of information. Determine what the user's priorities are: what does the user want or need to do first, second, third, and so on?

Determine focus and emphasis.
People in the western cultures look at the upper left corner of the screen or window for the most important information, therefore, it makes sense to put a top-priority item there, giving it emphasis.

Apply the principle of structure and balance.
There will be a lack of order and meaning without an underlying structure and a balance of visual elements. More importantly, a lack of structure and balance makes it more difficult for the user to clearly understand the interface.

Apply the principle of relationship of elements.
If a button in a dialog box affects the content of a list box, there should be a spatial relationship between the two elements. This helps the user to clearly and quickly make the connection just by looking at the placement.

Communicate ideas directly and simply.
The principle of readability and flow calls for ideas to be communicated directly and simply, with minimal visual interference. Readability and flow will impact the usability of a dialog box or other interface component.

Evaluate a given design in relationship to its larger environment.
When an application's interface is visually unified with the general interface of Windows, it offers a consistent and predictable work environment.

Reuse existing controls or UI concepts in your sketches and prototypes.
Start with as much consistency as you can. The Windows Interface guidelines are of great value here in helping you to reuse as much existing knowledge and good design work as possible.

Web Graphic Standards

The Web has become a visual medium. Graphics are everywhere, and many web pages serve as excellent examples of inappropriate use of graphics. Large, slow to download graphics annoy users who want to get on with their task, not wait for useless graphics to load. Eye-catching, distracting animated GIFs proliferate web pages for the sole purpose of demonstrating the developer's ability to create them.

Use the appropriate graphic format for web graphics, either GIF or JPG, depending upon the type of graphic.
The best way to decide which format to use is to save the image in each format, then compare the aesthetics of the image and the size. Choose the smallest image that looks the best. For detailed information about GIF and JPEG, refer *to More on Graphics* in this document.

All web graphics must be 72 dpi.
DPI, or dots per inch, are a measure of print resolution. On paper, a graphic that is 72 dpi will be the same size as a graphic that is 300 dpi, but the graphic at 300 dpi will look better. On a web page, the graphic that is 300 dpi will appear more than 4 times larger than the graphic that is 72 dpi, will be a larger file that takes longer to download, and will not look any better.

Keep the size of a web graphic to 24K or less.
Downloading images slows the display of a web page considerably, especially for users with slow modems. Most designers format web pages using HTML tables and small graphics that touch one another to form the displayed image. Breaking a large image into several small images can speed up download time, but you can reach a point of diminishing return if there are too many small images. Balance the number of images and image byte sizes to achieve acceptable page load time. (If you can't hold your breath until the page loads, it is too slow!)

Always optimize graphics.
Optimizing a graphic eliminates unnecessary colors and reduces the bit depth of the graphic, resulting in a graphic near the quality of the original, but with a much smaller byte size. Use DeBabelizer or Fireworks to optimize graphics.

Always specify the height and width attributes in the IMG tag in HTML.
Specifying the height and width of a graphic does not cause the graphic to load faster, but it does allow the browser to continue displaying text while the graphics load. If the page is designed well, the user can often accomplish their tasks before the graphics load!

Always provide useful information about the image in the ALT attribute in the IMG tag in HTML.

The information in the ALT attribute appears on the screen while the graphic is loading. Sighted users can determine if they want to wait for the graphic to load when they have an idea what it is. They can also click on a graphical link and jump to another page before the graphic loads. Users that are vision-impaired and are using assistive devices to "read" the web page will also be able to "read" the information provided by the ALT attribute.

Always test the web site with graphics turned off.
Some users use the browser feature to turn graphics off, speeding up load times. Always test your web site with graphics turned off to be sure that users will still be able to navigate the site and find what they need without the graphics.

Do not use animated GIFs in a CDC surveillance web site.
Animated GIFs are very distracting, making a web site more difficult to read comfortably.

Do not use image maps.
An image map is generally a large graphic with a number of "hot spots" or places where the user can click to jump to another page. Image maps may reside on the server (server-side image map) or on the user's computer (client-side image map). Image maps are generally slow to download so should be avoided. When the user passes the cursor over a server-side image map, the coordinates of the "hot spot" appears at the bottom left of the page, providing totally useless information for the user. When the user passes the cursor over a client-side image map, the URL of the link appears at the bottom left of the page, providing very useful information for the user.

Place logos in a consistent location and make them the same size.
Human beings naturally tend to reapply learned knowledge, and good designers will use this to make better designs. Consistency helps reduce the users cognitive load.

Use a specific icon consistently.
Throughout all Web pages use the same size, shape, and label at the same location to perform the same function.

Web Graphic Guidelines

The following guidelines address basic design principles with respect to Web page design and the page layout process.

Create a page layout grid.
Establish a basic layout grid that will determine how the major blocks of type and graphics will occur on the pages. Set placement standards for major screen titles, subtitles, and navigation links and buttons. The *Sample Standard Grid Layout* illustrates how a standard web page might look.

Sample Standard Grid Layout
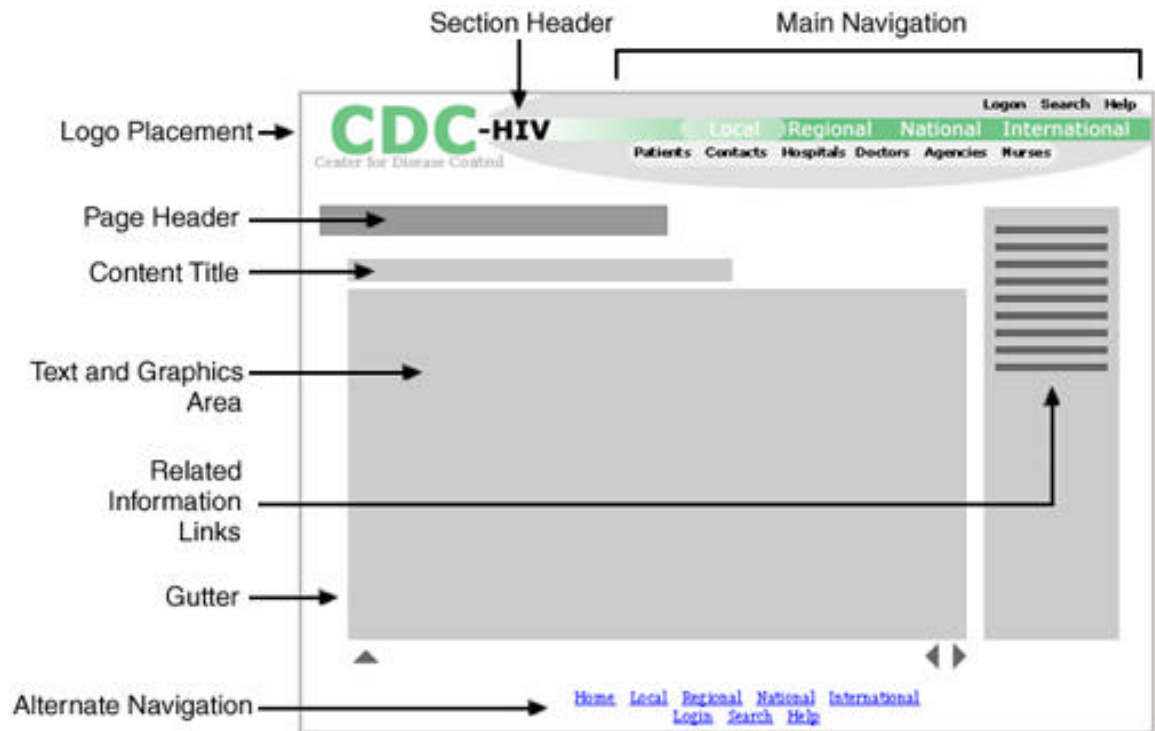
Use color schemes consistently. (Please refer to the CDC Style Guide – Color)
Content that is to be read linearly from page to page should be designed using a consistent color scheme. To avoid monotony, use similar design elements that change slightly from page to page.

Use text as a design element. (Please refer to the CDC Style Guide – Fonts)
Changing the weight of the typeface and using different typefaces for specific purposes can differentiate various parts of the site.

Insert subheads. (Please refer to the CDC Style Guide – Writing for Online Viewing)
Break up large blocks of text and enable sections to stand out according to subject by using subheads. Subheads also enable users to scan the entire page to find what they are looking for. Bold the type or use colors that are in the web design's palette.

Write good text links and offer multiple navigation approaches. (Please refer to the CDC Style Guide – Navigation)
Be brief and to the point when creating navigation links. Choose words that convey what the user can expect on the other end of the hyperlink. To avoid confusing the user about where they are within the organization of information, use clear, consistent icons, graphic identity schemes, and graphic or text-based

overview and summary screens. Users should always be able to return to the home page and other major navigation points in the site.

Make what is important larger in size.
Determine graphic priorities. Make what is important larger in size than what is least important. Help the user easily figure out what is most important.

Place the most important content at the top.
Very few people scroll below the information displayed on the page's initial screen so you must place what you really want them to see at the top of the page. Important links should also be at the top of the page.

Icons may be used as descriptive graphics.
These graphics describe and support the user's task, for example, a picture of a house in a real estate application. Use short, descriptive textual labels next to the icons to indicate their functions.

Design for 7 or less distinct elements.
Use 7 or less different areas of the page. For instance, the title is one element, a navigation bar would be a second element, text links to major areas would be a third element. Then within each element, stick to 7 or less, for example, a navigation bar should have 7 or less items within it.

Use 30% of the page for "white space."
At least 30 percent of the page should be white space. Of the remaining 70%, only use 30 percent for text. If you have graphics, they can fill the rest of the space. If you do not fill the rest of the space with graphics, then increase the amount of white space you are using. Pages with white space are easier to read and scan. In addition, open space on a page makes the page comfortable and inviting.

More on Graphics

GIF Format
CompuServe developed the GIF, or Graphical Interchange Format, especially for the Web. The GIF file format uses a basic form of file compression (Lempel Zev Welch, or LZW) that indexes each area of solid color to one of 256 colors without causing a loss of any data ("lossless compression") or distortion of the image. The LZW compression scheme is most efficient at compressing images with large fields of solid color. GIFs work best for graphics, such as line art, illustrations, cartoons, or logos. Graphics with limited colors (less than 256) won't lose any quality.

In *interlaced* GIF files the image data is stored in a format that allows browsers to begin to build a low-resolution version of the full-sized GIF picture on the screen while the file is still downloading. Interlaced graphics do not load faster than non-interlaced graphics, they just look as if they download faster because the rough preview comes up faster. Some experts believe the most important benefit

of interlacing is that it gives the user a quick preview of the full area of the picture. Other experts recommend not using interlaced GIFs for important visual information that is critical to viewing the site. A navigation icon must be seen in order to fulfill its function.

Transparent GIFs are used to create the illusion of irregularly shaped graphics. By nature, all computer-generated images end up as rectangular-shaped files. Transparent GIFs allow you to use a graphic that appears free-floating. Only the GIF format supports transparency features.

Each pixel in a GIF is indexed to one of 256 colors, a scheme that generally results in an image with a small byte size that is quick to load. The GIF format is especially suited for graphics with large areas of flat (a single) color.

JPEG Format
JPEG is a compression algorithm developed by the Joint Photographic Expert's Group especially for photographic images. JPEG uses a very sophisticated mathematical technique called a discrete cosine transformation to produce a sliding scale of graphics compression. Thus you can choose the degree of compression you wish to apply to an image in JPEG format, but in doing so you also are also choosing the image quality.

JPEG can compress graphics down to as much as 100 times smaller than the original file. This is possible because the JPEG algorithm discards "unnecessary" data as it compresses the image, and is thus called a "lossy" compression technique. For this reason, do not apply JPEG compression to a file that already has been compressed as a JPEG. Each time JPEG compression is applied the image will degrade beyond repair. Save original artwork as Photoshop files, or use formats such as PICT, TIFF, EPS, or BMP. Saving an image as a JPEG should be the last step.

A JPEG image may contain millions of colors, but when displayed on a monitor with only 256 colors, will be dithered to approximate the original color. Dithering can make an image appear pixelated, or broken up into noticeable areas where the pixels appear prominent. A JPEG image is generally larger than a GIF in terms of bytes and may take longer to load. Also, additional time is taken while the image is decompressed.

The figure titled *GIF versus JPEG* summarizes the pros and cons of each image format.

GIF versus JPEG

	GIF	JPEG
Feature	**Has transparency feature and can be animated.**	**Compresses complex images efficiently and the degree of compression is user-controlled.**

Drawback	Limited to 256 colors.	Uses a "lossy" compression method – not good for images with few colors.
Best use	Best for graphics with large areas of flat color.	Best for photographs or illustration with gradiated colors.
Size	Generally smaller.	Generally larger.

Canvas Size

The following figure titled *Maximum Canvas Size* shows the maximum canvas sizes for 640x480 and 800x600 screen resolutions. This is the maximum canvas size the designer has to work with when designing a web page. These measurements were taken with the browsers in their default states after installation — that is, with all toolbars showing. Remember that many people never turn toolbars off and are browsing the Web through very small windows. In these examples the Microsoft Windows taskbar at the bottom of PC screen was visible.

The horizontal size is with the browser window maximized on the screen. If the width gets any bigger, you'll get a horizontal scrollbar or your content won't be visible to users. The vertical size measures the amount of space "above the fold" — that is, what users can see without scrolling down.

Maximum Canvas Size
(all measurements shown in pixels)

Browser	640x480 width	640x480 height	800x600 width	800x600 height
IE 5.x (Win)	600	275	760	395
NN 4.5 (Win)	604	294	764	414
NN 4.0 (Win)	604	294	764	414
IE 4.x (Win)	600	275	760	395
NN 3.x (Win)	600	270	760	390
IE 3.x (Win)	613	276	763	396

The figure titled *Canvas Size* shows the canvas size of an example browser at 640x480 pixels.

Canvas Size
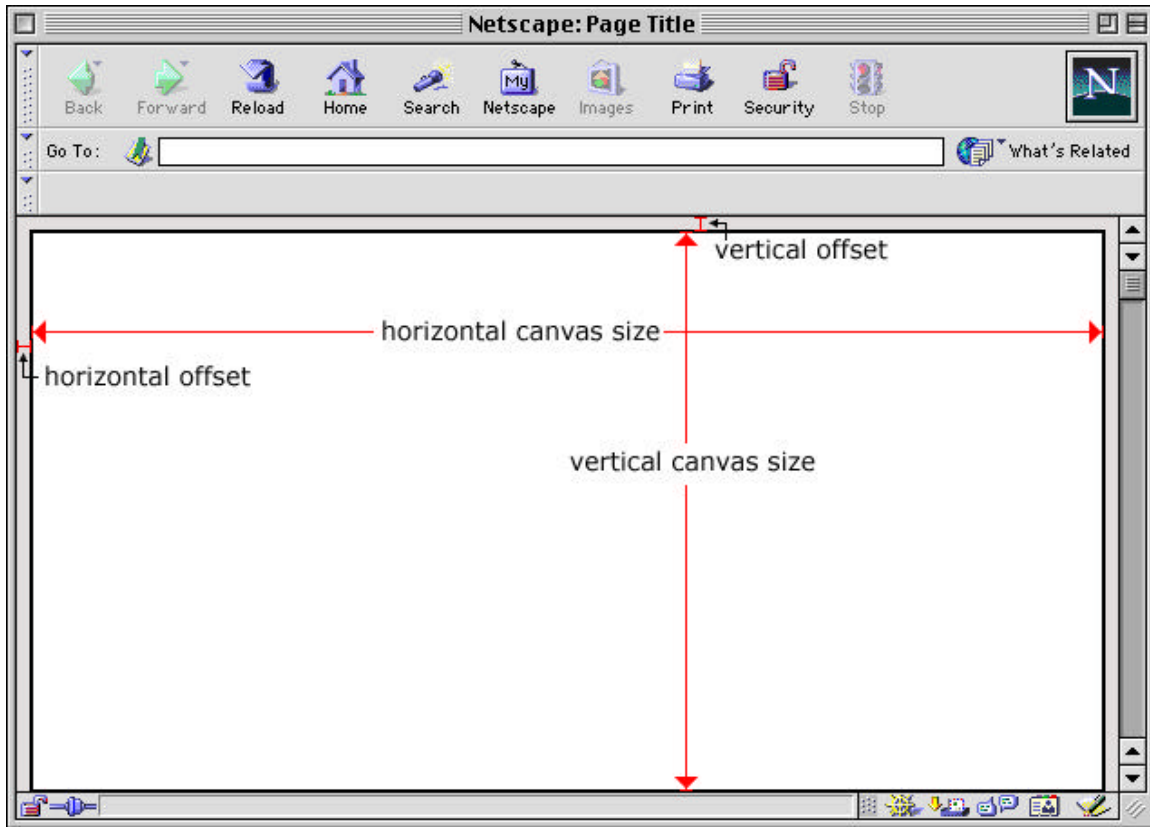
Naming Conventions for Graphic Files

Graphics should be identified with a naming convention that is used site-wide. It is recommended that the date be used within the file name, usually month and year. Whatever most clearly identifies a graphic and is simple, is usually the best choice. Deciding on the naming conventions ahead of production time will save frustration and confusion during the actual production and building of the site.

For example, graphics used for navigation can start with "nav" to identify them as navigation elements. If there are navigation elements used at the top and left side of the page, indicate "top_nav" or "left_nav". A specific example for a graphic that is on the home page, links to a statistics page, was created for launch in January of 2000 and resides in the left navigation could be named "home_leftnav_stats_0100.gif."

Recommended Readings

Horton, William K., The Icon Book: Visual Symbols for Computer Systems and Documentation, John Wiley & Sons, 1994

Lynch, Patrick J. and Horton, Sarah, *Web Style Guide,* Yale University Press, 1999

Nielsen, Jakob, *The Practice of Simplicity,* New Riders Publishing, 1999

Weinman, Lynda, *Designing Web Graphics.3,* New Riders Publishing, 1999

Helpful Web Sites

The Microsoft Developers Network Online Library of Books, specifically the online version of *The Windows Interface Guidelines for Software Design* now known as *The Windows User Experience.*
http://msdn.microsoft.com/isapi/msdnlib.idc?theURL=/library/books/winguide/PLATFR M2/D5/S115B5.HTM

Photoshop files for download available at
http://hotwired.lycos.com/webmonkey/99/41/index3a_page3.html?tw=design

1. 640x480-pixels browsers — zipped Photoshop file with the chrome of all the major browsers
2. 800x600-pixels browsers — zipped Photoshop file with the chrome of all the major browsers

Jakob Nielsen's web site contains a comprehensive archive of articles on usability from his column, *The Alert Box*.
http://www.useit.com

David Siegel's Book Site, *Secrets of Successful Web Sites.*
http://www.secretsites.com/home/set_core.html

National Center for Accessible Media
http://www.boston.com/wgbh/ncam/